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**EUROPEAN CONFERENCE
ON ADVANCED MATERIALS
AND PROCESSES**



AD-A218 358

NOVEMBER 22 - 24, 1989
AACHEN, FEDERAL REPUBLIC OF GERMANY

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A CONFERENCE OF

f.e.m.s.

FEDERATION OF EUROPEAN MATERIALS SOCIETIES



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DEUTSCHE GESELLSCHAFT FÜR METALLKUNDE E.V.
Adenauerallee 21 · D-6370 Oberursel · Tel. (06171) 4081 · Fax (06171) 52554

Acknowledgements

The societies participating in f.e.m.s. would like to thank the sponsors:

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Science, Research and Development, Bruxelles;

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for financial support which made this event possible.

The organizing committee expresses its appreciation to all those who helped
and who agreed to participate actively in the programme.

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Keywords: West Germany (JG)

f.e.m.s.

Federation of European Materials Societies

The aims of the Federation are to facilitate communication and the exchange of information between its members, to foster the wide dissemination of scientific, technical and related knowledge relevant to materials and to coordinate the activities of member organisations so as to achieve the most effective use of resources.

Any national or multinational society in Western Europe active in materials sciences and technology may apply to join the Federation.

MEMBERS

Austria

Verein Eisenhütte Österreich

Federal Republic of Germany

Deutsche Gesellschaft für Metallkunde
Deutscher Verband für Materialforschung und -prüfung

France

Société Française de Metallurgie

Italy

Associazione Italiana di Metallurgia

Portugal

Sociedade Portuguesa de Materiais

Spain

Centro Nacional de Investigaciones Metalurgicas

Sweden

Svenska Föreningen för Materialteknik

Switzerland

Schweizerischer Verband für die Materialtechnik

United Kingdom

Institute of Metals

Welcoming Address

At a time in which commercial and academic ties between the Western European states are becoming closer and stronger, the academic and technological societies of the individual countries are also playing a new and additional role. Dissemination of new knowledge, cooperation in the solution of technological and academic problems and intensification of cross-border ties at a personal level will, in future, make an essential contribution to the overall commercial success of Europe.

The intention of the Federation of European Materials Societies (f.e.m.s.), in which the European materials oriented societies have joined forces, is to foster this cooperation. Following f.e.m.s. participation in several European conferences in recent years, at which in each case an individual, closely defined, technological or academic topic was discussed, EUROMAT '89 will treat the latest results from materials research and materials engineering in a more comprehensive way. EUROMAT '89 will thus become the first in a series of bi-annual f.e.m.s. meetings, at which European materials experts can present and discuss the latest results from research and engineering practice.

In the name both of the member institutions of f.e.m.s. and of this year's host society we extend a hearty welcome to all participants in EUROMAT '89. We are certain that this meeting will present an impressive picture of the capabilities of European industry, research institutes and universities. As well as the exchange of results, the clarification of hitherto unanswered questions and the stimulation of further work, an essential goal of EUROMAT '89 is to encourage personal contact between participants, the strengthening of existing ties and the establishment of new bonds. With this in mind, we wish you both an interesting time professionally and a rewarding stay personally in Aachen, which, as Germany's most westerly city with much charm and tradition, lies right at the heart of Europe.



M. Lallement
President
Federation of European Materials Societies



G. Petzow
President
Deutsche Gesellschaft für Metallkunde e. V.

Organizing Committee

Conference Chairman	H. E. Exner, Max-Planck-Institut für Metallforschung, Stuttgart (FRG)
Symposia Chairmen	P. Costa, Office National d'Etudes et de Recherches Aérospatiales, Châtillon (France) D. Driver, Rolls-Royce plc., Derby (UK) U. Köster, Universität Dortmund (FRG) J. Poirier, Commissariat à l'Energie Atomique, Paris (France) M. Sammet, IBM Deutschland GmbH, Sindelfingen (FRG) E. R. Wallach, University of Cambridge (UK)
Workshop Moderators	W. Kurz, Ecole Polytechnique Fédérale de Lausanne (Switzerland) R. Stickler, Universität Wien (Austria)
Committee Members	N. Claussen, Technische Universität Hamburg-Harburg (FRG) M. Colombie, Institut de Recherches de la Sidérurgie Française, Saint-Germain-en-Laye (France) D. Dew-Hughes, University of Oxford (UK) P. Ehrhart, Kernforschungsanlage Jülich (FRG) D. G. Morris, Université de Neuchâtel (Switzerland) H. Mughrabi, Universität Erlangen-Nürnberg, Erlangen (FRG) L. Schultz, Siemens AG, Erlangen (FRG) R. Wagner, GKSS-Forschungszentrum Geesthacht GmbH, Geesthacht (FRG) J. G. Wurm, Commission of the European Communities, Bruxelles (Belgium)
Managing Chairman	V. Schumacher, Deutsche Gesellschaft für Metallkunde e.V., Oberursel (FRG)

Introduction

EUROMAT '89, the first European Conference on Advanced Materials and Processes, is being organized by Deutsche Gesellschaft für Metallkunde on behalf of the recently founded Federation of European Materials Societies (f.e.m.s.). It has been planned as a major event in the field, defining the state of the art in several selected topics. The present knowledge on these topics is reviewed in plenary sessions while detailed discussions take place in parallel oral sessions and in an extensive poster show. A plenary session and two parallel workshops give a resume of the results of the joint research work going on in the European Communities focussing on COST actions related to the symposia topics. An exhibition of products of manufacturers and service companies complements the scientific programme.

The selected topics are arranged in five symposia as follows:

Symposium A: Advanced Processing

Near Net Shape Processing with Optimized Microstructures via Forging, Casting and Powder Technology

Symposium B: Special Materials

High Temperature Materials (B I)

Biomaterials (B II)

Symposium C: High Technology Applications

Materials Science in Electronic Packaging and Device Technology

Symposium D: Basic Phenomena

Interface Reactions

Symposium E: Innovative Analysis Methods

Recent Developments in Microscopy (Scanning Tunneling, Force and Acoustic Microscopy)

Some of these topics are strongly interrelated. This is particularly true for symposia A and B and symposia C, D and E. Joint sessions of symposia C and D on Interfaces in Packaging are intended to avoid some of the conflict of interest which the conference participants may experience. In addition, the time schedule of the oral presentation has been designed such that it is easily possible to move from one symposium to another.

A significant part of the submitted papers are presented as posters in 23 topical groups.

Ample time to discuss posters has been provided during the breaks and at a special poster evening. The organizers hope that this arrangement will stimulate extensive discussions in fields related to the symposia topics as well as in other fields of current interest.

The COST plenary session and workshops are seen as a timely and logical opportunity to complement symposia A and B by displaying recent results to a broad audience. The success of the COST actions demonstrates how effective joint efforts in the European communities have been, in spite of language and other problems which may exist. The organizers anticipate a widening of interest and, in turn, promotion of joint research in the growing region covered by the materials societies of f.e.m.s.

Thus, the organizers hope that EUROMAT '89 will make a significant contribution to unification of European activities in the field of materials science and technology. A hearty welcome in Aachen to all participants on behalf of the organizing committee!

H. E. Exner
Conference Chairman

General Information

Conference Location

The European Conference on Advanced Materials and Processes will be held in the
Eurogress Aachen
Monheimsallee 52
D-5100 Aachen

The lectures of the various sections will be held in several lecture halls as indicated in the programme.

The poster presentations will be on display in the foyer of the congress center during the entire conference.

Conference Office

The conference office is located in the foyer of the congress center. Opening times of the conference office are:

Tuesday, November 21, 1989	15.00 h to 18.00 h
Wednesday, November 22, 1989	8.00 h to 18.00 h
Thursday, November 23, 1989	8.00 h to 12.30 h
	13.45 h to 18.00 h
Friday, November 24, 1989	8.00 h to 12.45 h
	13.30 h to 15.15 h

Conference Telephone

The conference office's telephone number is
02 41/15 10 18
during office hours.

Conference Language

The conference language will be English. No simultaneous translation will be provided.

Conference Secretariat/Registration

All those who wish to attend the conference should complete the enclosed **Registration Form** and return it to the conference secretariat:

Deutsche Gesellschaft für Metallkunde e. V.
Adenauerallee 21
D-6370 Oberursel
Federal Republic of Germany
Phone: 061 71/40 81
Telefax: 061 71/52 54

Deadlines

No deadline is given for conference registration. However, please note that an increased fee will be charged for payments received after October 30, 1989 and that hotel reservation should be completed before October 15, 1989 in order to guarantee accommodation in Aachen.

Exhibition

An exhibition of technical displays, scientific equipment, devices and literature will be held in connection with the conference. For further details contact the conference secretariat.

Registration Fee

The conference fees for the European Conference on Advanced Materials and Processes are as follows:

- Participants DM 820,-
The fee includes:
Attendance at the technical meetings, administrative cost, two selected volumes of the proceedings after the conference (the proceedings will consist of 3 volumes), extended abstracts, welcome reception, poster buffet, snack on Friday, refreshments during the official breaks.
- A limited number of registrations will be available on request at a reduced rate of DM 450,- **for colleagues** from universities until **October 15, 1989**.
The fee includes:
Attendance at the technical meetings, administrative cost, extended abstracts, welcome reception, poster buffet, snack on Friday, refreshments during official breaks. (This fee does not include the proceedings).
- A limited number of registrations will be available on request at a reduced rate of DM 225,- **for students** until **October 15, 1989**. The request must be signed by an authorized person of the respective university.
The fee includes:
Attendance at the technical meetings, administrative cost, extended abstracts, welcome reception, poster buffet, snack on Friday, refreshments during the official breaks. (This fee does not include the proceedings).
- Accompanying persons who are not interested in the scientific programme DM 40,-
The fee includes:
Administrative cost, welcome reception.

The fee for the conference banquet on Wednesday, November 22, 1989 is DM 60,-

Payment of the conference fee plus fees for accompanying persons and the conference banquet should be made upon mailing the Registration Form not later than October 30, 1989 in DM (Deutsch-Marks). Payment of the registration fee after this date will require an increase of 5%. Payment should be made by bank transfer to

Deutsche Gesellschaft für Metallkunde e. V.,
Adenauerallee 21, D-6370 Oberursel
Federal Republic of Germany

Banking account:

- Dresdner Bank, D-6370 Oberursel (FRG)
Account-No 6 100 478 00
Bank Sorting Code 500 800 00 (important)

For exceptional use only:

- Payment by cheque

Please include the delegate's name and the conference name "EUROMAT" on all money transfers.

Since the bank charge amounts to DM 10,-, we respectfully request participants from abroad to add this amount to the conference fee when making payment.

The fee for the conference banquet includes 14% V.A.T. The conference fee is free of V.A.T.

Delegates will receive confirmation and further information following receipt of the registration form and the conference fees.

After November 10, 1989, no further conference information material will be mailed, but will be handed over at the conference office in Aachen.

It is regretted that only a 75% refund can be made on cancellations up to November 10, 1989 and that no refunds can be made after this date.

Lists of participants, extended abstracts, information material and other documents will be available at the conference office in Aachen, which will be open during the entire conference (times given on page 8).

Conference Proceedings

Proceedings of the European Conference on Advanced Materials and Processes (3 volumes, approx. 2000 pages) will be published after the Conference. The delegates may select 2 of 3 volumes of the proceedings. These are included in the conference fee of DM 820,-.

Accommodation

Verkehrsverein Bad Aachen e. V.
Monheimsallee 52
Postfach 2007
D-5100 Aachen
Phone: 0241-1802950 and 0241-1802951

has been appointed the official agent for hotel reservations. Please use the enclosed **booking form for hotel reservations**.

Delegates will receive confirmation of hotel reservations directly from the "Verkehrsverein Bad Aachen".

Hotel reservations should be made **before October 15, 1989**.

Participants are requested to notify any changes or cancellations of room reservations to the hotel directly.

Insurance

Deutsche Gesellschaft für Metallkunde as organizer of the conference cannot accept responsibility for personal accident or loss of or damage to the private property of participants and accompanying persons which may occur either during, or arising from the conference. Participants should, therefore, take whatever steps they consider necessary regarding insurance.

Restaurants

There are a number of restaurants in the town including that in the conference building where participants may take lunch. No special arrangements for lunch will be made on Wednesday and Thursday. There will be a quick lunch on Friday which is included in the fee.

Transport facilities

No transport to the congress center will be necessary as it is easily accessible by foot from all hotels.

Car Parking

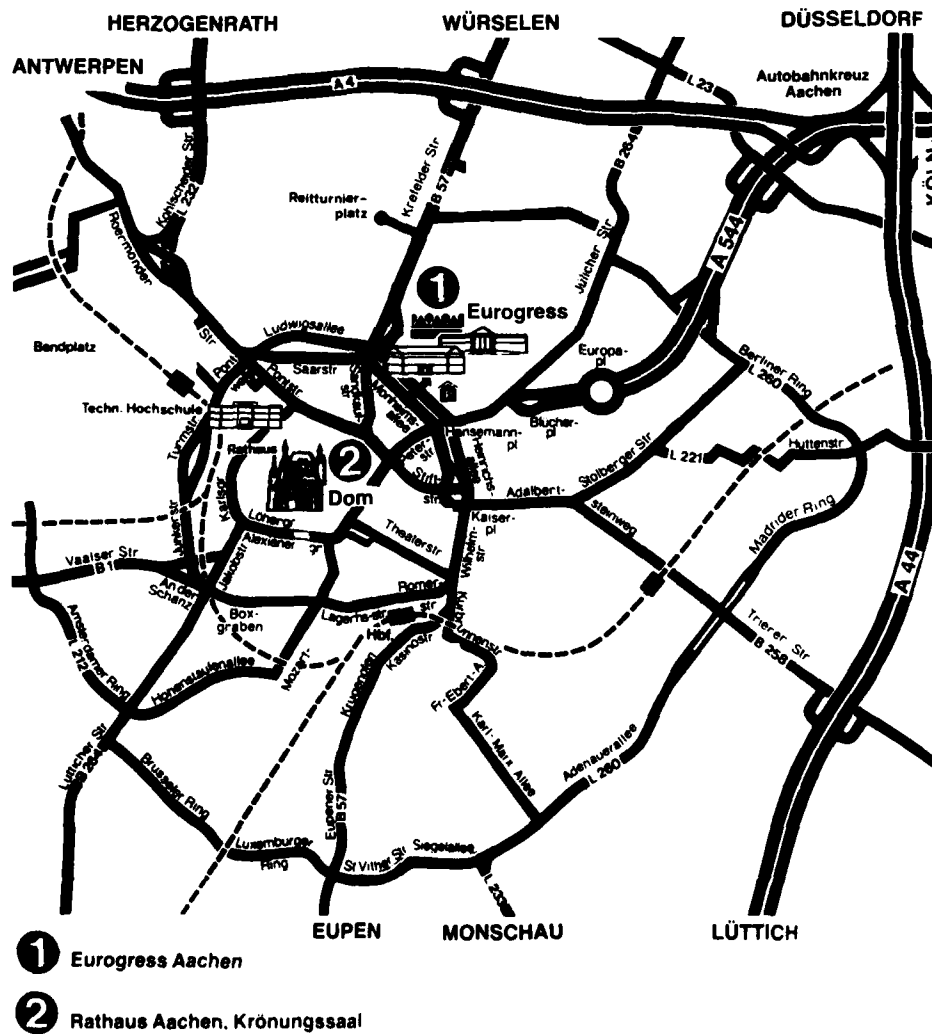
Car parking space will be available at the Eurogress (payment of the parking fee is required).

Travel to Aachen

Aachen can be reached:

by car: via Autobahn 4 from Köln Airport
via Autobahn 44 from Düsseldorf Airport
via Autobahn A 76 from Antwerpen and Maastricht
via Autobahn A 3 from Brüssel, Lüttich . . .

by air: two major airports – Köln/Bonn and Düsseldorf – are on the doorstep to Aachen. By train it takes 1.30 h to get from the airport Köln/Bonn or Düsseldorf to Aachen.



Social Events

Tuesday, November 21

Welcoming Reception

Eurogress

Welcome to the Federal Republic of Germany and to Aachen! You are cordially invited to attend a reception in the foyer of the conference center Eurogress where you can renew old acquaintances and make new friends from industry and the universities.

Beginning at: 18.30 h**End:** 20.00 h (approx.)

No booking required.

Wednesday, November 22

Conference Banquet

Coronation Hall in Aachen Town Hall



At the beginning of the 14th century the citizens of Aachen took charge of the decaying palace building and built the Gothic town hall on the very same foundations. The citizens of Aachen committed themselves to providing it with a hall for the Crowning Meal. Charles IV was the first to hold a Crowning Meal after his coronation in 1349.

An evening to remember in the rich setting of the city's medieval charms.

Beginning at: 20.00 h**End:** 23.00 h

Booking required.

Thursday, November 23

Poster Evening

Eurogress

On Thursday, November 23, 1989, 18.30 h a buffet will be served in the foyer of the Europa Saal (where the posters are on display). The price for the buffet is included in the conference fee and beverages will be served until 22.00 h. Authors of posters are asked to be present from 18.30 to 22.00 h.

OPENING SESSION

Chairmen:

C. Beernaert, President, Société Française de Métallurgie (France)
Sir Geoffrey Ford, General Secretary, Federation of European Materials Societies (UK)

9.00 Welcome Addresses

- P. M. Fasella, Directeur General, Commission of the European Communities, Directorate-General for Science, Research and Development, Bruxelles (Belgium)
- R. Lalllement, President, Federation of European Materials Societies (France)
- G. Petzow, President, Deutsche Gesellschaft für Metallkunde e. V. (FRG)

9.20 Introductory Paper

Y. Farge, PECHINEY, Paris (France)

Which Materials will be Successful in the Future?

PLENARY SESSION 1

Chairmen:

T. Ericsson, President, Svenska Föreningen för Materialteknik (Sweden)
G. Petzow, President, Deutsche Gesellschaft für Metallkunde (FRG)

10.00 W. Bonfield, Queen Mary College, London (UK)

Biomaterials for Bones and Joint Replacement

10.40 BREAK

PLENARY SESSION 2

Chairmen:

J. Leupp, Schweizerischer Verband für die Materialtechnik (Switzerland)
Sir Robert Scholey, President, Institute of Metals (UK)

11.20 G. W. Meetham, Rolls-Royce plc., Derby (UK)

High Temperature Materials – The Overall View

12.00 B. C. Johnson, E. I. Du Pont de Nemours and Co., Wilmington (USA)

Trends in High Performance Integrated Circuit Packaging

12.40 LUNCH

- 14.00 Near Net Shape Processing (I): Forging, page 17
High Temperature Materials (I): Superalloys, page 23
Biomaterials, page 29
Materials Science in Electronic Packaging and Device Technology (I): Ceramic Packaging, page 31

PLENARY SESSION 3**Chairmen:**

P. N. Hansen, Dansk Metallurgisk Selskap (Denmark)

H. Hiebler, President, Verein Eisenhütte Österreich (Austria)

9.00 U. Gösele, Duke University, Durham (USA)

Kinetic and Thermodynamic Instabilities in Thin Film Reactions

9.40 G. Ertl, Fritz Haber Institut der Max Planck Gesellschaft, Berlin (FRG)

Microscopy of Surfaces

10.20 BREAK

11.00 Near Net Shape Processing (II): Casting, page 19

High Temperature Materials (I): Superalloys, page 25

Interfaces in Packaging (I): Thin Film Packaging and Polymer/Metal Interfaces, page 35

Recent Developments in Microscopy (I): Scanning Tunneling and Force Microscopy, page 40

PLENARY SESSION 4**Joint Efforts in European
Materials Science and Technology****Chairmen:**

H. E. Exner, Max-Planck-Institut für Metallforschung, Stuttgart (FRG)

J. G. Wurm, Commission of the European Communities, Bruxelles (Belgium)

9.00 A. Gracia-Arroyo, Commission of the European Communities, Bruxelles (Belgium)

Opportunities for Materials Research in EC Funded Programmes

9.20 T. B. Gibbons, National Physical Laboratory, Teddington (UK)

COST 501: A Concerted European Action in the Field of SUPERALLOYS

9.40 R. Stickler, University Wien (Austria)

COST 503: A Concerted European Action in the Field of POWDER METALLURGY

10.00 W. Kurz, Ecole Polytechnique Fédérale de Lausanne (Switzerland)

COST 504: A Concerted European Action in the Field of CASTING TECHNOLOGY

10.20 BREAK

11.00 Workshop 1: COST 503 "Powder Metallurgy", page 15

Workshop 2: COST 504 "Advanced Casting and Solidification Technology", page 16

Materials Science in Electronic Packaging and Device Technology (II): Materials, Trends and

Processing in Advanced Packaging, page 33

Interface Reactions, page 38

Workshop 1: COST 503 "Powder Metallurgy"

11.00–12.40

Moderator:

R. Stickler, Universität Wien (Austria)

Group 1: Powder Metallurgy of Light Metals and Alloys

Introduction by the Coordinator M. J. Couper (Switzerland)

M. J. Couper (Switzerland), R. Schäfer (FRG), G.R.D. Shrimpton (UK), B. Weiss (Sp) (Austria)

Fatigue and Fracture of Advanced PM-Al Alloys

M. J. Couper (Sp) (Switzerland), M. Hohman (FRG), P. Schwellinger (Switzerland), S. Savage (Sweden)

Processing and Properties of Rapidly Solidified Al Alloys**Group 2: Powder Metallurgy of Hard Materials**

Introduction by the Coordinators H. Ortner, K. Weiss (Austria)

Review Presentation: H. Ortner (Austria)

The Influence of Trace Impurities on Technology and Properties of Hard Materials

Project Collaborators: G. Friedbacher (Austria), M. Grasserbauer (Austria), E. Kübel (FRG), A. Kirvesniemi (Finland), B. Lux (Austria), H. Manninen (Finland), W.-D. Schubert (Austria), H. Tülhoff (FRG), B. Uhrenius (Sweden), P. Wilhartitz (Austria)

Group 3: Powder Metallurgy of Fe-Based Alloys

Introduction by the Coordinator W. Paton (UK)

D. Pohl (Sp) (FRG), O. Kohlbacher (Austria)

Development of Powder Metallurgical Roller Bearings for Large Constructions

K. Lipp (FRG), R. Lawcock (UK), K. Richter (FRG), G. Schlieper (FRG), C. Sonsino (Sp) (FRG), J. Tengzelius (Sweden)

Development of Connecting Rods from Sintering Steels for Car Engines

12.40 LUNCH

13.45 Near Net Shape Processing (II): Powder Technology, page 22
High Temperature Materials (II): Composites and Ceramics, page 28
Materials Science in Electronic Packaging and Device Technology (II): Materials, Trends and Processing in Advanced Packaging, page 34
Interface Reactions, page 39

Affiliation refers to speaker (Sp).

Workshop 2: COST 504 "Advanced Casting and Solidification Technology"

11.00–12.40

Moderator:

W. Kurz, Ecole Polytechnique Fédérale de Lausanne (Switzerland)

W. Schäfer (Sp), F. Hediger, J. C. Sturm, RWTH Aachen (FRG)

Numerical Modelling of Heat Transfer at Interfaces: Finite Element Approaches Testing and Examples

F. Syvertsen, SINTEF, Trondheim (Norwegen)

Simulation of Moldfilling and Temperature Distribution in a Casting

A. Roósz (Sp), H. E. Exner, Technical University for Heavy Industry, Miskolc (Hungary)

Phase Stability Diagram of a Ternary Aluminium Alloy System

M. Rappaz (Sp), J. D. Richoz, P. Thévoz, Ecole Polytechnique Fédérale de Lausanne (Switzerland)

Modelling of Solidification of Nodular Cast Iron

F. Mampaey, WTCM Gieterijcentrum, Zwijnaarde (Belgium)

Modelling of Cast Iron Microstructure

J. Lacaze (Sp), G. Lesoult, Ecole des Mines, Nancy (France)

Nucleation of Graphite Particles in Grey and S. G. Cast Irons

E. Lundbäck (Sp), I. L. Svensson, The Royal Institute of Technology, Stockholm (Sweden)

Computer Simulations of Structure and Mechanical Properties of Nodular Cast Iron

12.40 LUNCH

- 13.45 Near Net Shape Processing (III): Powder Technology, page 22
High Temperature Materials (III): Composites and Ceramics, page 28
Materials Science in Electronic Packaging and Device Technology (II): Materials, Trends and Processing in Advanced Packaging, page 34
Interface Reactions, page 39

Affiliation refers to speaker (Sp).

SYMPOSIUM A: Advanced Processing**Near Net Shape Processing (I): Forging***Session 1***Chairmen:**

D. Driver, Rolls-Royce plc., Derby (UK)

M. Rappaz, Ecole Polytechnique Fédérale de Lausanne (Switzerland)

Opening by Symposium Chairman.

14.00 Keynote

R. W. Evans, University College of Swansea (UK)

Microstructural Modelling in Near Net Shape Forging*Discussion*14.40 G. W. Kuhlman (Sp), A. K. Chakrabarti, D. A. Beabout, K. D. Armanie, D. A. Lukasak,
R. Pishko, Alcoa Forging Division, Cleveland (USA)**Critical Aspects of Thermomechanical Processing in Al/Ti Precision Forging
Manufacture***Discussion*

15.00 A. Vassel (Sp), J. F. Uginet, M. H. Campagnac, ONERA, Châtillon (France)

**Improved Microstructure and Properties of Ti-10V-2Fe-3Al Titanium Alloy
through Isothermal Forging***Discussion*

15.20 J. W. Brooks, INCO Engineered Products Ltd., Birmingham (UK)

The Application of Finite Element Modelling to Isothermal Forging*Discussion***15.40 BREAK**

16.10 Near Net Shape Processing (I): Forging, page 18

High Temperature Materials (I): Superalloys, page 24

Biomaterials, page 30

Materials Science in Electronic Packaging and Device Technology (I): Ceramic Packaging, page 32

Near Net Shape Processing (I): Forging
Session 2

Chairmen:

D. Dew-Hughes, University of Oxford (UK)
H. W. Grünling, Asea Brown Boveri AG, Mannheim (FRG)

16.10 P. P. Schepp, Sulzer AG, Winterthur (Switzerland)

Isothermal Forging: Forming Close to Final Shape with Demanding Materials and Complex Geometries

Discussion

16.30 B. O. Oyekanmi (Sp), T. A. Hughes, A. N. Bramley, National Metallurgical Research and Development Centre, Jos (Nigeria)

Application of Recrystallization Behaviour in Quantification of Deformation

Discussion

16.50 M. Lamberigts (Sp), E. Diderrich, L. Mosy, Centre de Recherches Métallurgiques, Liège (Belgium)

Mandrelless Rotary Forging: Theoretical Modelling and Experiments

Discussion

17.10 A. Tietmann (Sp), K. Baldner, R. Kopp, RWTH Aachen (FRG)

Squeeze Forging: A Near Net Shape Technique for High Strength Applications

Discussion

17.30 M. Horiata (Sp), K. Ohuchi, T. Sano, Mechanical Engineering Laboratory, Tsukuba, Ibaraki (Japan)

High Temperature Properties of Die Materials for Isothermal Forging

Discussion

17.50 L. Jílek (Sp), L. Jelen, Vítkovice, Ostrava (CSSR)

Large Forgings for Nuclear Power Generating Equipment

Discussion

18.10 END

20.00 Conference Banquet, page 12

Affiliation refers to speaker (Sp).

Near Net Shape Processing (II): Casting

Session 1

Chairmen:

T. W. Clyne, University of Cambridge (UK)
P. R. Sahm, Rhein.-Westf.-Techn. Hochschule Aachen (FRG)

11.00 Keynote

A. W. D. Hills, Sheffield (UK)

Microstructural Engineering of Near Net Shape Casting

Discussion

11.40 C. Liesner, Titan-Aluminium-Feinguß GmbH, Bestwig (FRG)

Light Metal Investment Casting

Discussion

12.00 T. Mizoguchi (Sp), K.-I. Miyazawa, Nippon Steel Corporation, Kawasaki (Japan)

Formation of Solidification Structure in a Twin-Roll Rapid Solidification Process

Discussion

12.20 J. Beuers (Sp), E. Lange, J. Haußelt, Degussa AG, Hanau (FRG)

Metal Injection Moulding – Microstructural Design by Enhanced Sintering Technique

Discussion

12.40 LUNCH

14.00 Near Net Shape Processing (II): Casting, page 20
High Temperature Materials (II): Steels, page 26
Recent Developments in Microscopy (I): Scanning Tunneling and Force Microscopy, page 41

14.20 Interfaces in Packaging (II): Metal/Ceramic Interfaces and Packaging, page 36

Near Net Shape Processing (II): Casting

*Session 2***Chairmen:**

E. Blank, Ecole Polytechnique Fédérale de Lausanne (Switzerland)

M. Blazy, C 3 F-Airforge, Paris (France)

14.00 B. L. Mordike (Sp), K. U. Kainer, J. Schröder, Technische Universität Clausthal, Clausthal-Zellerfeld (FRG)

Short Fibre Reinforced Magnesium Alloys Produced by Squeeze Infiltration*Discussion*

14.20 P. Bárczy, Technical University for Heavy Industry, Miskolc (Hungary)

Directionally Solidified Al-Ni(Me) Eutectics*Discussion*

14.40 S. Patel (Sp), I. C. Elliott, Inco Alloys Ltd., Hereford (UK)

Advanced Melting Techniques for Superalloys*Discussion*

15.00 F. Durand, Grenoble Polytechnic Institute, Saint Martin d'Heres (France)

Castability Test: Modelling and Related Experiments*Discussion*

15.20 P. Kapranos (Sp), D. H. Kirkwood, C. M. Sellars, University of Sheffield (UK)

The Microstructure of Thixotropic Alloy Slurries*Discussion*

15.40 BREAK

16.10 Near Net Shape Processing (III): Powder Technology, page 21
High Temperature Materials (III): Composites and Ceramics, page 27
Interfaces in Packaging (II): Metal/Ceramic Interfaces and Packaging, page 37
Recent Developments in Microscopy (II): Acoustic Scanning Microscopy, page 42

Affiliation refers to speaker (Sp).

Near Net Shape Processing (III): Powder Technology*Session 1***Chairmen:**

W. A. Kaysser, Max-Planck-Institut für Metallforschung, Stuttgart (FRG)
P. P. Schepp, Sulzer AG, Winterthur (Switzerland)

16.10 Keynote

E. Bachelet, SNECMA, Evry (France)

Microstructural Development in Powder Technology

Discussion

16.50 H. Grazzini (Sp), P. Lasne, C. Levailant, Ecole des Mines de Paris, Valbonne (France)

**Powder Metallurgy Preform Design for Powder Forging:
A Physical Simulation Method Using a Model Material**

Discussion

17.10 J. Zhou (Sp), J. Duszczek, Laboratory for Materials Science, Delft (The Netherlands)

**Microstructural Features of the Extruded Al-20Si-3Cu-1Mg Alloy
Prepared from Rapidly Solidified Powder**

Discussion

17.30 S. Hodiamont (Sp), W. Bunk, Deutsche Forschungsanstalt für Luft- und Raumfahrt,
Köln (FRG)

**Effect of the Consolidation Method on the Microstructure of PM/RS
Aluminium Alloys**

Discussion

17.50 M. Jeandin (Sp), F. Barbalat, C. Blain, T. C. Lu, P. Luquet, Ecole Nationale Supérieure
des Mines de Paris, Evry (France)

**Study of Plasma-Sprayed Graded W-Cu Composites Using Glow
Discharge Spectrometry Compared to Quantitative Image and
Electron Probe Analyses**

Discussion

18.10 END

18.30 Poster Evening, page 12 and page 43

Affiliation refers to speaker (Sp).

Near Net Shape Processing (III): Powder Technology
Session 2

Chairmen:

F. Jeglitsch, Montanuniversität Leoben (Austria)
D. G. Morris, Université Neuchâtel (Switzerland)

13.45 W. Kahl (Sp), J. Leupp, Swiss Aluminium Ltd., Neuhausen (Switzerland)

Spray Deposition of High Performance Aluminium Alloys Via the Osprey Process

Discussion

14.05 M. Igharo (Sp), T. Kirby, J. V. Wood, The Open University, Milton Keynes (UK)

Development of High Speed Steels Produced by the Osprey Process

Discussion

14.25 A. Leatham (Sp), P. F. Chesney, R. Pratt, D. Zebrowski, Osprey Metals Ltd., Neath (UK)

The Osprey Process – A Versatile Manufacturing Technology for the Production of Solid and Hollow Rounds and Clad (Compound) Billets

Discussion

14.45 T. W. Clyne (Sp), P. A. Dearnley, K. A. Roberts, University of Cambridge (UK)

In-Flight Phenomena During Vacuum Plasma Co-Spraying of Titanium-Based Composites

Discussion

15.05 END

Affiliation refers to speaker (Sp).

SYMPOSIUM B I: Special Materials**High Temperature Materials (I): Superalloys***Session 1***Chairmen:**

P. Costa, Office National d'Etudes et de Recherches Aéronautiques, Châtillon (France)

H. Mughrabi, Universität Erlangen-Nürnberg, Erlangen (FRG)

Opening by Symposium Chairman.

14.00 Keynote

T. B. Gibbons, National Physical Laboratory, Teddington (UK)

The Superalloys: Present Status and Future Prospects*Discussion*

14.40 J. Hammer (Sp), H. Mughrabi, Universität Erlangen-Nürnberg, Erlangen (FRG)

High Temperature Creep and Microstructure of the Monocrystalline Nickel Base Superalloy SRR 99*Discussion*

15.00 T. Khan (Sp), P. Caron, ONERA, Châtillon (France)

The Anisotropy of Mechanical Behaviour in Nickel-Based Single Crystal Superalloys for Turbine Blades*Discussion*

15.20 F. Schubert (Sp), H. J. Penkalla, A. Weisbrodt, Kernforschungsanlage Jülich GmbH, Jülich (FRG)

PHASCALC: An Improved Computer Programme for the Calculation of Phase Kinetics, Microstructural Parameters and Microstructural Instabilities in Nickel-Base Superalloys*Discussion***15.40 BREAK**

16.10 High Temperature Materials (I): Superalloys, page 24

Near Net Shape Processing (I): Forging, page 18

Biomaterials, page 30

Materials Science in Electronic Packaging and Device Technology (I): Ceramic Packaging, page 32

Affiliation refers to speaker (Sp).

High Temperature Materials (I): Superalloys

*Session 2***Chairmen:**

D. Coutouradis, Centre de Recherches Metallurgique, Liège (Belgium)

R. Wagner, GKSS-Forschungszentrum Geesthacht GmbH (FRG)

16.10 G. Scheunemann-Frerker (Sp), M. Feller-Kniepmeier, Technische Universität Berlin (FRG)

On the Choice of APB Planes in the γ' -Phase of Nickel Based Superalloys with High Volume Fractions of γ' *Discussion*

16.30 P. Veyssi re (Sp), N. Cl ment, D. Caillard, ONERA, Ch tillon (France)

The Fine Structures of Dislocations and Their Mobility in Ordered Intermetallic Alloys*Discussion*

16.50 D. Blavette (Sp), A. Buchon, S. Chambrelaud, Laboratoire de Microscopie Ionique, Mont Saint Aignan (France)

Influence of Heat Treatments on Phase Composition and Fine Scale Features of Some Ni Base Superalloys: A FIM Atom-Probe Investigation*Discussion*

17.10 J.-L. Strudel (Sp), A. Fredholm, Ecole Nationale Sup rieure des Mines de Paris, Evry (France)

Creep Resistance, γ' Shape Changes and Dislocation Structures in Nickel Base Single Crystals*Discussion*

17.30 A. Marucco (Sp), E. Lang, V. Lupinc, Consiglio Nazionale Delle Ricerche, Cinisello Balsamo (Italy)

The Effect of Thermomechanical Treatments on Short Range Ordering and Carbide Precipitation in a Ni-Cr Based Superalloy*Discussion*

17.50 E. E. Affeldt (Sp), G. W. K nig, MTU Motoren- und Turbinen-Union M nchen GmbH, M nchen (FRG)

Effect of Time and Temperature on Crack Propagation in a Nickel Base Superalloy (Udimet 700)*Discussion*

18.10 END

20.00 Conference Banquet, page 12

Affiliation refers to speaker (Sp).

High Temperature Materials (I): Superalloys

Session 3

Chairmen:

T. Khan, ONERA, Châtillon (France)

K. Schneider, Asea Brown Boveri AG, Mannheim (FRG)

11.00 H. Bernard (Sp), L. Remy, Ecole des Mines de Paris, Evry (France)

Thermal-Mechanical Fatigue of an Aluminide Coated Nickel Base Superalloy*Discussion*

11.20 R. P. Wahi (Sp), M. D. Mathew, V. Singh, W. Chen, Hahn-Meitner-Institut Berlin GmbH, Berlin (FRG)

Effect of Hold Time on the Low Cycle Fatigue Behaviour of Nimonic PE 16*Discussion*

11.40 T. Baumgärtner (Sp), K. Bothe, W. M. Laanemäe, V. Gerold, Max-Planck-Institut für Metallforschung, Stuttgart (FRG)

Thermomechanical Fatigue of Nimonic 80A*Discussion*

12.00 R. D. Townsend, Central Electricity Research Laboratories, Leatherhead (UK)

Steels for High Temperature Applications*Discussion*

12.20 C. Leymonie (Sp), G. Thauvin, A. Coulon, GEC Alsthom, Belfort (France)

Some 12% Cr Steels Developed for Fossil Steam Turbine HP and MP Parts*Discussion*

12.40 LUNCH

14.00 High Temperature Materials (II): Steels, page 26
Near Net Shape Processing (II): Casting, page 20
Recent Developments in Microscopy (I): Scanning Tunneling and Force Microscopy, page 41

14.20 Interfaces in Packaging (II): Metal/Ceramic Interfaces and Packaging, page 36

Affiliation refers to speaker (Sp).

High Temperature Materials (II): Steels**Chairmen:**

T. B. Gibbons, National Physical Laboratory, Teddington (UK)

G. Pomey, Société Française de Métallurgie, Paris (France)

14.00 Keynote

G. Kalwa, Mannesmann Forschungsinstitut, Duisburg (FRG)

Steels for High Temperature Applications*Discussion*

14.40 P. P. Schepp (Sp), U. Heisel, T. Hollstein, K. Torssell, Sulzer AG, Winterthur (Switzerland)

Powdermetallurgical Fabrication of Steam Line Components from Advanced 9-12% Cr Steels*Discussion*

15.00 E. Tolksdorf (Sp), K. Schneider, J. Schubert, B. Trück, VGB Technische Vereinigung der Großkraftwerksbetreiber e. V., Essen (FRG)

The Influence of Precipitated Carbides on Toughness Properties of X 20 CrMoV 12 1*Discussion*

15.20 M. H. Van de Voorde, Joint Research Centre Petten Establishment, Petten (The Netherlands)

High Temperature Materials in Fossil Fuel Conversion Technology*Discussion***15.40 BREAK**

- 16.10 High Temperature Materials (III): Composites and Ceramics, page 27
Near Net Shape Processing (III): Powder Technology, page 21
Interfaces in Packaging (II): Metal/Ceramic Interfaces and Packaging, page 37
Recent Developments in Microscopy (II): Acoustic Scanning Microscopy, page 42

Affiliation refers to speaker (Sp).

High Temperature Materials (III): Composites and Ceramics

Session 1

Chairmen:

P. Boch, ESPCI, Paris (France)

R. Brook, Max-Planck-Institut für Metallforschung, Stuttgart (FRG)

16.10 Keynote

J. F. Jamet, Aerospatiale, Saint-Medard-en-Jalles (France)

State of the Art and Future Prospects for High Temperature Composites

Discussion

16.50 G. Navarre (Sp), G. Fantozzi, D. Rouby, Institut National des Sciences Appliquées, Villeurbanne (France)

Fracture Behaviour of Ceramic-Ceramic Composites and Related Toughening Mechanisms

Discussion

17.10 M. Rühle (Sp), G. H. Campbell, A. G. Evans, University of California, Santa Barbara (USA)

Microstructure and Mechanical Properties of Ceramic Composites

Discussion

17.40 K.-H. Zum Gahr, Kernforschungszentrum Karlsruhe (FRG)

Tribological Properties of Engineering Ceramics

Discussion

18.10 END

18.30 Poster Evening, page 12 and page 43

High Temperature Materials (III): Composites and Ceramics
Session 2

Chairmen:

N. Claussen, Technische Universität Hamburg-Harburg (FRG)

G. Ziegler, Deutsche Forschungsanstalt für Luft- und Raumfahrt e.V., Köln (FRG)

13.45 A. Mocellin, Ecole des Mines, Nancy (France)

Some Recent Developments on Superplasticity of Ceramics

Discussion

14.05 P. R. Boch, ENSCI, Limoges (France)

Resistance of Ceramics to Thermal Shocks

Discussion

14.25 M. Seibold (Sp), P. Greil, Technische Universität Hamburg-Harburg (FRG)

Composite Ceramics from Polymer-Metal Mixtures

Discussion

14.45 H. Schmidt, Fraunhofer-Institut für Silicatforschung, Würzburg (FRG)

Sol-Gel Derived Ceramics

Discussion

15.05 END

Affiliation refers to speaker (Sp).

SYMPOSIUM B II: Special Materials**Biomaterials***Session 1***Chairmen:**

W. Bonfield, Queen Mary College, London (UK)

J. Poirier, Commissariat à l'Energie Atomique, Paris (France)

Opening by Symposium Chairman.

14.00 Keynote

R. Ranc (Sp), D. Maziere, Centre d'Etudes Nucléaires de Grenoble (France)

Carbons for Biomedical Applications*Discussion*

14.40 J. Geis-Gerstorfer (Sp), E. H. Greener, Universität Tübingen (FRG)

Effect of Mo-Content and pH on Pitting Corrosion of Ni-Cr-Mo Dental Alloys*Discussion*

15.00 W. V. Youdelis, University of Windsor (Canada)

Indium in Dispersed Phase Amalgam: Effect on Properties and Mercury Vapor Release*Discussion*

15.20 P. Poyet (Sp), P. Guiraldenq, UNIREC, Firminy (France)

Study of Metal-Ceramic Interface for Dental Applications*Discussion***15.40 BREAK**

16.10 Biomaterials, page 30

Near Net Shape Processing (I): Forging, page 18

High Temperature Materials (I): Superalloys, page 24

Materials Science in Electronic Packaging and Device Technology (I): Ceramic Packaging, page 32

Wednesday

Symposium B II
Special Materials

Maastricht Saal

Biomaterials

Session 2

Chairmen:

J. F. Rieu, Ecole Nationale Supérieure des Mines, Saint-Etienne (France)

W. V. Youdelis, University of Windsor (Canada)

16.10 C. Mattheck (Sp), S. Burkhardt, D. Erb, K. Schubert, Kernforschungszentrum Karlsruhe GmbH, Karlsruhe (FRG)

A New Fatigue Resistant Prothesis Surface

Discussion

16.30 A. Pichat (Sp), L. M. Rabbe, J. Rieu, C. Chabrol, R. Leveque, G. Bousquet, A. Rambert, Ecole Nationale Supérieure des Mines, Saint-Etienne (France)

Effect of Ionic Implantation on Titanium Alloy-Polyethylene Friction Couple in Joint Protheses

Discussion

16.50 U. Gennari, Metallwerk Plansee GmbH, Reutte (Austria)

Optimization of ODS-Niobium for Load-Bearing Implants with Excellent Biocompatibility

Discussion

17.10 B. Gibbesch (Sp), G. Elssner, G. Petzow, Max-Planck-Institut für Metallforschung, Stuttgart (FRG)

Mechanical and Chemical Properties of Ti/Al₂O₃ Joints for Dental Implants

Discussion

17.30 H. Carrerot (Sp), J. Rieu, G. Bousquet, A. Rambert, Ecole Nationale Supérieure des Mines, Saint-Etienne (France)

Ceramic Plasma Spray Coatings on Metallic Joint Protheses

Discussion

17.50 J. Lemaître (Sp), A. A. Mirtchi, E. Munting, Ecole Polytechnique Fédérale de Lausanne (Switzerland)

Microstructure and Strength Development in Calcium Phosphate Biocements

Discussion

18.10 END

20.00 Conference Banquet, page 12

Affiliation refers to speaker (Sp).

*SYMPOSIUM C: High Technology Applications***Materials Science in Electronic Packaging and Device Technology (I): Ceramic Packaging***Session 1***Chairmen:**

P. Coeure, Centre d'Etudes Nucléaires de Grenoble (France)
M. Sammet, IBM Deutschland GmbH, Sindelfingen (FRG)

Opening by Symposium Chairman.

14.00 Keynote

R. Tummala, IBM Yorktown, Hopewell Junction (USA)

Ceramics in Microelectronics

Discussion

14.40 D. Holland (Sp), E. Logan, Warwick University, Coventry (UK)

Glass-Ceramics in High Performance Microelectronic Packages

Discussion

15.00 P. Foley (Sp), G. Wingefeld, F. Aldinger, Hoechst AG, Frankfurt (FRG)

Ceramic Filled Glass Composites for Multilayer Substrates

Discussion

15.20 R. Monteiro (Sp), J. Kunesch, A. Frisch, W. A. Kaysser, Universidade Nova de Lisboa, Monte de Caparica (Portugal)

Hipping of Alumina-Glass Systems

Discussion

15.40 BREAK

16.10 Materials Science in Electronic Packaging and Device Technology (I): Ceramic Packaging, page 32
Near Net Shape Processing (I): Forging, page 18
High Temperature Materials (I): Superalloys, page 24
Biomaterials, page 30

Materials Science in Electronic Packaging and Device Technology (I): Ceramic Packaging
Session 2

Chairmen:

E. Bischoff, Max-Planck-Institut für Metallforschung, Stuttgart (FRG)
A. Roosen, Hoechst AG, Frankfurt (FRG)

16.10 R. Brückner (Sp), H. Hegeler, C. Reich, Technische Universität Berlin (FRG)

**Fundamentals and Development of Fibre Reinforced Glasses and Glass
Ceramics**

Discussion

16.30 V. Gunay, University of Sheffield (UK)

Fibre Reinforced Glass and Glass-Ceramics by the Sol-Gel Process

Discussion

16.50 S. Nazaré (Sp), R. Heidinger, Kernforschungszentrum Karlsruhe (FRG)

**Sintering Studies of AlN for the Improvement of Dielectric Properties
at Microwave Frequencies**

Discussion

17.10 W. Mader (Sp), D. Schwabe, Max-Planck-Institut für Metallforschung, Stuttgart (FRG)

Fabrication and Characterization of Low-Energy Metal/AlN Interfaces

Discussion

17.30 R. Queriaud (Sp), P. Lefort, M. Billy, University of Limoges (France)

**Compatibility Between Tungsten and Aluminium Nitride: Influence of a
Calcium Oxide Additive**

Discussion

17.50 A. Kranzmann (Sp), G. Petzow, Max-Planck-Institut für Metallforschung, Stuttgart (FRG)

**Influence of Sinter Additives on the Thermal Conductivity of
Pressureless Sintered Aluminium Nitride**

Discussion

18.10 END

20.00 Conference Banquet, page 12

Affiliation refers to speaker (Sp).

Materials Science in Electronic Packaging and Device Technology (II): Materials, Trends and Processing in Advanced Packaging

Session 1

Chairmen:

H. Reichl, Technische Universität Berlin (FRG)
K. Roeser, Siemens AG, München (FRG)

11.00 S. Roth, Max-Planck-Institut für Festkörperforschung, Stuttgart (FRG)

Charge Transport in Conductive Polymers – Physical Principles and Applications

Discussion

11.40 H. E. Hoenig, Siemens AG, Erlangen (FRG)

High T_c -Superconductors for Packaging

Discussion

12.20 J. Margail (Sp), C. Jaussaud, M. Bruel, A. M. Papon, Centre d'Etudes Nucléaires de Grenoble (France)

Silicon on Insulator for Microelectronic Devices

Discussion

12.40 LUNCH

13.45 Materials Science in Electronic Packaging and Device Technology (II): Materials, Trends and Processing in Advanced Packaging, page 34
Near Net Shape Processing (III): Powder Technology, page 22
High Temperature Materials (III): Composites and Ceramics, page 28
Interface Reactions, page 39

Materials Science in Electronic Packaging and Device Technology (II): Materials, Trends and Processing in Advanced Packaging

Session 2

Chairmen:

H. L. Hartnagel, Technische Hochschule Darmstadt (FRG)

R. Tummala, IBM East Fishkill, Hopewell Junction (USA)

13.45 H. Hieber, CEM, Neumünster (FRG)

Microjoining Techniques

Discussion

14.25 A. Million (Sp), J. Piagnet, T. Colin, L. Di Ciocio, Centre d'Etudes Nucléaires de Grenoble (France)

Molecular Beam Epitaxy of HgCdTe Compounds

Discussion

14.45 A. J. Oster, IBM Deutschland, Sindelfingen (FRG)

IBM Large System Packaging Evolution

Discussion

15.05 END

Affiliation refers to speaker (Sp).

JOINT SYMPOSIUM C + D:
High Technology Applications/Basic Phenomena

Interfaces in Packaging (I):
Thin Film Packaging and Polymer/Metal Interfaces

Chairmen:

G. Elsner, IBM Deutschland GmbH, Sindelfingen (FRG)

J. Petermann, Technische Universität Hamburg-Harburg (FRG)

Opening by Symposium Chairmen.

11.00 Keynote

M. Grunze, Universität Heidelberg (FRG)

Applications and Properties of Polyimides in Microelectronic Devices

Discussion

11.40 F. Faupel (Sp), D. Gupta, B. D. Silverman, P. S. Ho, Universität Göttingen (FRG)

Tracer Diffusion of Ag and Cu in Polyimide

Discussion

12.00 T. Hoffmann (Sp), J. Petermann, Technische Universität Hamburg-Harburg (FRG)

Epitaxy of Metals on Polymer Substrates

Discussion

12.20 M. Stratmann, Max-Planck-Institut für Eisenforschung, Düsseldorf (FRG)

Stability and Reactivity of Chemically Modified Iron Surfaces

Discussion

12.40 P. Pagés (Sp), A. Andrés, Universidad Politécnica de Cataluña, Terrassa (Spain)

Fourier Transform Infrared Characterization of the Glass Matrix Interface

Discussion

13.00 LUNCH

14.00 Near Net Shape Processing (II): Casting, page 20

High Temperature Materials (II): Steels, page 26

Recent Developments in Microscopy (I): Scanning Tunneling and Force Microscopy, page 41

14.20 Interfaces in Packaging (II): Metal/Ceramic Interfaces and Packaging, page 36

Affiliation refers to speaker (Sp).

**Interfaces in Packaging (II):
Metal/Ceramic Interfaces and Packaging***Session 1***Chairmen:**

D. Holland, University of Warwick, Coventry (UK)

L. Schultz, Siemens AG, Erlangen (FRG)

14.20 M. Rühle (Sp), A. G. Evans, University of California, Santa Barbara (USA)

Structure, Chemistry and Fracture Resistance of Metal/Ceramic Interfaces*Discussion*14.40 B. Gibbesch (Sp), G. Elssner, H. F. Fischmeister, Max-Planck-Institut für Metallforschung,
Stuttgart (FRG)**Ultra High Vacuum Bonded Metal/Sapphire Joints***Discussion*

15.00 B. Ralph (Sp), P. L. Flaitz, V. Randle, The University of West London, Uxbridge (UK)

Bonding of MgO to Copper Containing Dilute Alloy Additions*Discussion*

15.20 R. Schmid-Fetzer, Technische Universität Clausthal, Clausthal-Zellerfeld (FRG)

Stability of Metals and Intermetallics on GaAs*Discussion*

15.40 BREAK

- 16.10 Interfaces in Packaging (II): Metal/Ceramic Interfaces and Packaging, page 37
Near Net Shape Processing (III): Powder Technology, page 21
High Temperature Materials (III): Composites and Ceramics, page 27
Recent Developments in Microscopy (II): Acoustic Scanning Microscopy, page 42

Affiliation refers to speaker (Sp).

Interfaces in Packaging (II): Metal/Ceramic Interfaces and Packaging
Session 2**Chairmen:**

P. Ehrhart, Kernforschungsanlage Jülich (FRG)

W. M. Stobbs, University of Cambridge (UK)

16.10 J. Kivilahti (Sp), J. Öini, M. Paulasto, S. Pienimaa, Helsinki University of Technology, Espoo (Finland)

Effects of Brazing Parameters on the Microstructures and Thermal Fatigue Behaviour of the AlN/Cu Joints Produced by an Activated Ag-Cu Filler Material*Discussion*

16.30 F. Hong (Sp), D. Holland, University of Warwick, Coventry (UK)

Glass-Ceramic Coatings on High Temperature Alloys*Discussion*

16.50 W. Weise (Sp), H. Krappitz, W. Malikowski, Degussa AG, Hanau (FRG)

Active Metal Brazing of Silicon Nitride*Discussion*

17.10 L. J. Bostelaar (Sp), M. T. J. Verhees, Philips Research Laboratories Eindhoven (The Netherlands)

The Metallization of AlN by a W-Containing Paste*Discussion*

17.30 R. Leucht (Sp), H.-J. Dudek, G. Ziegler, Deutsche Forschungsanstalt für Luft- und Raumfahrt, Köln (FRG)

Thermal Stability of SiC-Fibre Reinforced Ti6Al4V-Alloys*Discussion*

17.50 G. Neite (Sp), H.-J. Dudek, W. Bunk, K. H. Matucha, Metallgesellschaft AG, Frankfurt (FRG)

Fibre-Matrix Interface in Cast Al₂O₃-Aluminium Alloy Composites*Discussion*

18.10 END

18.30 Poster Evening, page 12 and page 43

Affiliation refers to speaker (Sp).

SYMPOSIUM D: Basic Phenomena**Interface Reactions***Session 1***Chairmen:**

G. Beranger, Université de Technologie de Compiègne (France)

U. Köster, Universität Dortmund (FRG)

Opening by Symposium Chairman.

11.00 Keynote

W. M. Stobbs, University of Cambridge (UK)

New TEM Techniques for the Characterisation of a Boundary*Discussion*

11.40 B. Ralph, The University of West London, Uxbridge (UK)

Grain Boundary Engineering*Discussion*

12.00 J. Philibert, Université de Paris-Sud, Orsay (France)

Reactive Diffusion*Discussion*

12.20 M. Pajunen (Sp), J. Kivilahti, J. Miettinen, Helsinki University of Technology, Espoo (Finland)

Thermodynamic and Kinetic Consideration of the Ti-Si Diffusion Couple*Discussion***12.40 LUNCH**

13.45 Interface Reactions, page 39

Near Net Shape Processing (III): Powder Technology, page 22

High Temperature Materials (III): Composites and Ceramics, page 28

Materials Science in Electronic Packaging and Device Technology (II): Materials, Trends and Processing in Advanced Packaging, page 34

Affiliation refers to speaker (Sp).

Interface Reactions

*Session 2***Chairmen:**

A. L. Greer, University of Cambridge (UK)

K. Urban, Kernforschungsanlage Jülich (FRG)

13.45 J. Eckert (Sp), L. Schultz, K. Urban, Siemens AG, Erlangen (FRG)

Interfacial Reactions and Amorphous Phase Formation in Ni-Zr Composite Wires*Discussion*

14.05 K. Samwer (Sp), H. Schröder, S. Eickert, A. Regenbrecht, S. Schneider, B. Schuhmacher, U. Köster, Universität Augsburg (FRG)

Phase Sequence in the Solid State Amorphization Reaction of Metallic Thin Films*Discussion*

14.25 M.-H. Ambroise, Régie Nationale des Usines Renault, Boulogne Billancourt (France)

Some Aspects of Metal-Metal Bonding*Discussion*

14.45 H. J. Böving (Sp), H. E. Hintermann, Centre Suisse d'Electronique et de Microtechnique S. A., Neuchâtel (Switzerland)

Advanced Technology Titanium Carbide Coated Bearings*Discussion*

15.05 END

*SYMPOSIUM E: Innovative Analysis Methods***Recent Developments in Microscopy (I):
Scanning Tunneling and Force Microscopy***Session 1***Chairmen:**

G. Ertl, Fritz-Haber-Institut der Max-Planck-Gesellschaft, Berlin (FRG)
E. R. Wallach, University of Cambridge (UK)

Opening by Symposium Chairman.

11.00 Keynote

J. K. Gimzewski, IBM Zürich Research Laboratory, Rüschlikon (Switzerland)

Local Experiments with the Scanning Tunneling Microscope

Discussion

11.40 H. G. Vehoff (Sp), M. Müller, P. Neumann, Max-Planck-Institut für Eisenforschung,
Düsseldorf (FRG)

**A Scanning Tunneling Microscope for the Examination of Local
Material Faults**

Discussion

12.00 F. Besenbacher (Sp), E. Lægsgaard, I. Stensgaard, University of Aarhus (Denmark)

A Fully Automated "Thimble Size" Scanning Tunneling Microscope

Discussion

12.20 D. Lawunmi (Sp), M. C. Payne, Cavendish Laboratory, Cambridge (UK)

Theoretical Study of Scanning Tunneling Microscope Images of Graphite

Discussion

12.40 LUNCH

14.00 Recent Developments in Microscopy (I): Scanning Tunneling and Force Microscopy, page 41
Near Net Shape Processing (II): Casting, page 20
High Temperature Materials (II): Steels, page 26

14.20 Interfaces in Packaging (II): Metal/Ceramic Interfaces and Packaging, page 36

Affiliation refers to speaker (Sp).

Recent Developments in Microscopy (I): Scanning Tunneling and Force Microscopy
*Session 2***Chairmen:**

G. A. D. Briggs, University of Cambridge (UK)

P. Neumann, Max-Planck-Institut für Eisenforschung GmbH, Düsseldorf (FRG)

14.00 Keynote

M. E. Welland, University of Cambridge (UK)

Scanning Tunneling Microscopy of Macromolecules*Discussion***14.40** H. Heinzelmann (Sp), E. Meyer, H. Rudin, H.-J. Güntherodt, Universität Basel (Switzerland)**Force Microscopy in Materials Science***Discussion***15.00** M. Pitsch (Sp), O. Metz, J. Strnad, H.-H. Kohler, Universität Regensburg (FRG)**Construction of an Atomic Force Microscope and Application in Surface Chemistry***Discussion***15.20** G. Bachmann (Sp), W. Berthold, H. Oechsner, Universität Kaiserslautern (FRG)**Work Function Raster Microscopy***Discussion***15.40 BREAK****16.10** Recent Developments in Microscopy (II): Acoustic Scanning Microscopy, page 42
Near Net Shape Processing (III): Powder Technology, page 21
High Temperature Materials (III): Composites and Ceramics, page 27
Interfaces in Packaging (II): Metal/Ceramic Interfaces and Packaging, page 37

**Recent Developments in Microscopy (II):
Acoustic Scanning Microscopy****Chairmen:**

H. Vettters, Institut für Werkstofftechnik, Bremen (FRG)

M. E. Welland, University of Cambridge (UK)

16.10 Keynote

G. A. D. Briggs, University of Oxford (UK)

How Sensitive is Acoustic Microscopy?*Discussion*

16.50 E. Matthaai (Sp), H. Vettters, P. Mayr, Stiftung Institut für Werkstofftechnik, Bremen (FRG)

**Reflective Scanning Acoustic Microscopy for Imaging Sub-Surface
Structures in Solid State Materials***Discussion*17.10 A. Kulik (Sp), G. Gremaud, S. Sathish, Ecole Polytechnique Fédérale de Lausanne
(Switzerland)**Direct Measurements of the SAW Velocity and Attenuation Using
Continuous Wave Reflection Scanning Acoustic Microscope***Discussion*

17.30 U. Beller (Sp), H.-A. Crostack, H.-D. Steffens, K. Reichel, Universität Dortmund (FRG)

**Use of Scanning Acoustic Microscopy to Characterize Cathodic
Arc Deposited CrN Films***Discussion*

17.50 S. Boseck (Sp), G. Heygster, H. Block, Universität Bremen (FRG)

**Investigations on the Defocussing Effects in a SAM at Straight
Amplitude and Phase Edges***Discussion***18.10 END**

18.30 Poster Evening, page 12 and page 43

Affiliation refers to speaker (Sp).

POSTER PRESENTATIONS

Some of the papers proposed for presentation during EUROMAT '89 will be displayed as posters during the entire conference. Extended coffee breaks between the oral sessions and a poster evening will provide an opportunity to discuss the papers with authors. Special times for individual discussions and contacts between authors and interested conference participants can be arranged by the conference secretariat on request.

The Poster Show will be displayed in the foyer in front of the Europa Saal from

Wednesday, November 22, 9.00 h

to

Friday, November 24, 15.00 h

The main event of the Poster Show will be a Poster Evening in the foyer where the posters are displayed,

on Thursday, November 23

at 18.30 h (open ended).

A buffet dinner will be served (price included in the conference fee for all participants) and beverages will be available until 22.00 h.

The posters are arranged in the following groups:

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II. Preparation and Processing of Powders	46
III. Surface Treatments and Laser Processing	47
IV. Fundamental Aspects of Superalloys	48
V. Single Crystal Superalloys	49
VI. Microstructure and Properties of Superalloys	50
VII. Heat Resistant and High Strength Steels	51
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XXIII. Grain Boundaries	67

A map on which the poster groups can be located is available at the secretariat desk.

Poster Group I.**Melt Refining, Casting Technology and Cast Iron**

- I. 1 D. Hartmann (Sp), U. Mürle, M. Krehl, Degussa AG, Hanau (FRG)
Electron Beam Melting and Refining of Superalloys
- I. 2 S. Chakravorty (Sp), M. S. Peck, P. N. Quested, National Physical Laboratory, Teddington (UK)
Cleanliness Evaluation of a Nickel-Base Superalloy: the Effects of Process Control During Electron Beam Button Melting
- I. 3 N. Eruslu (Sp), A. Altmışoğlu, Istanbul Technical University (Turkey)
The Effect of Alloying Elements Cu, Fe, Mg on the Eutectic Morphology of Unidirectional Solidification of Zn- 4% Al Alloys
- I. 4 N. Eruslu (Sp), A. Altmışoğlu, Istanbul Technical University (Turkey)
The Grain Refinement of Al-Cu-Zn Alloys by Low Frequency Vibration
- I. 5 H. Manninen (Sp), K. Lilius, J. Virolainen, Helsinki University of Technology, Espoo (Finland)
Binder Removal: The Effect of Binder Components
- I. 6 M. Ienciu (Sp), V. Brabie, P. Moldovan, L. Cristea, G. Neagu, Institut Politehnic Bucuresti (Romania)
Studies on the Interface Reactions in the Refining of Metallic Melts by Filtration
- I. 7 N. Eruslu (Sp), A. Altmışoğlu, Istanbul Technical University (Turkey)
The Properties of Sodium Aluminate Bonded Silica Cores
- I. 8 I. Katavić, University "V. Bakarić", Rijeka (Yugoslavia)
The Properties of a New Chromium White Iron in the As-Cast State
- I. 9 S. Pietrowski, Technical University, Lodz (Poland)
Hypereutectoid Cast Steel with Nodular Graphite and Bainite/Martensite Structure
- I. 10 K. Herfurth (Sp), G. Engels, E. Möllmann, Verein Deutscher Gießereifachleute, Düsseldorf (FRG)
Development of Properties and Areas of Application of Graphitic Cast Irons

Affiliation refers to speaker (Sp).

Poster Group II.**Preparation and Processing of Powders**

- II. 1 P. Le Brun (Sp), L. Froyen, B. Munar, L. Delaey, Katholieke Universiteit Leuven, Heverlee (Belgium)
Mechanical Alloying of Al-Fe Powders
- II. 2 D. Parlapanski (Sp), S. Denev, E. Gatev, Higher Mining-Geological Institute, Sofia (Bulgaria)
Mechanical Activation and Mechanical Alloying of Metallic Systems
- II. 3 D. Stock (Sp), P. R. Sahm, P. N. Hansen, RWTH Aachen (FRG)
Characteristics of Very Fine Metal Powders Produced by a Two-Step Atomization Technique
- II. 4 C. Delaunay (Sp), D. Locq, A. Walder, ONERA, Châtillon (France)
New Gas Atomisation Nozzles for Ultrafine Metal Powders
- II. 5 G. Matei (Sp), E. Bicsak, Institutul Politehnic, Cluj-Napoca (Romania)
The Morphology and the Structure of Hollow Powders Obtained by the Water Atomization of Some Nickel Alloys
- II. 6 R. Naß (Sp), H. Schmidt, Fraunhofer-Institut für Silicidforschung, Würzburg (FRG)
Electrophoresis: an Alternative Forming Technique for Submicron Ceramic Powders
- II. 7 M. A. López-Quintela (Sp), J. Rivas, J. Quibén, Universidad de Santiago de Compostela (Spain)
Preparation of Ultrafine Nd-Fe-B Magnetic Particles by Chemical Reduction in Microemulsions
- II. 8 G. Gusmano (Sp), P. Nunziante, E. Traversa, R. Montanari, F. Tarli, G. Chiozzini, Università Degli Studi di Roma "Tor Vergata" (Italy)
Preparation of Mixed Mg-Fe Hydroxides for Mg-Fe Spinel Formation
- II. 9 J. Schmiedl (Sp), E. Dudrová, F. Molnár, Technical University Košice (CSSR)
Electrochemical Alloying of Nickel and Copper to Prepare Fe-Ni-Cu Powder Metallurgical Systems

Affiliation refers to speaker (Sp).

Poster Group III.**Surface Treatments and Laser Processing**

- III. 1 K. Wendland (Sp), R. Prümmer, Fraunhofer-Institut für Werkstoffmechanik, Freiburg (FRG)
Surface Thermomechanical Treatment (STMT) as a Means to Improve the Service Behaviour of Materials
- III. 2 G. K. Wolf (Sp), M. Barth, W. Ensinger, A. Schröer, Universität Heidelberg (FRG)
Modification of Interface Properties by Ion Beam Techniques
- III. 3 A. R. Tarakçilar, Dokuz Eylül University, Denizli (Turkey)
The Effect of Hardening Depth on Fatigue Strength in Notched Carburizing Steel
- III. 4 A. Ç. Can, Dokuz Eylül University, Denizli (Turkey)
The Effect of High Temperature (1050° C) Carburizing on Fatigue Strength
- III. 5 K. S. Petkov (Sp), G. M. Mladenov, A. A. Kot, S. N. Doroshenko, Technological Centre for Electron Beam and Plasma Technologies and Technique, Sofia (Bulgaria)
Magnetic-Impulse Processing of Deposits with Changeable Properties and Thickness
- III. 6 V. Zábavník, Vysoká škola technická – Ústav výpočtovej techniky, Košice (CSSR)
Influence of Si on the Kinetics of Nitriding Layer Growth
- III. 7 M. Carrard (Sp), M. Gremaud, M. Zimmermann, W. Kurz, Ecole Polytechnique Fédéral de Lausanne (Switzerland)
A Novel Microstructure in Rapidly Solidified Al Alloys
- III. 8 M. Naeem (Sp), M. Preston, J. Tyrer, University of Technology, Loughborough (UK)
Processing of Ceramic Materials with High Power CO₂ Lasers
- III. 9 M. Preston (Sp), M. Naeem, J. Tyrer, University of Technology, Loughborough (UK)
Laser Machining of Ceramic Materials with High Power CO₂ Lasers
- III. 10 I. Minkoff (Sp), A. Mehlmann, A. Zur, Israel Institute of Technology, Haifa (Israel)
Laser Interactions with Surfaces and Technological Applications

Poster Group IV:**Fundamental Aspects of Superalloys**

- IV. 1 U. Glatzel (Sp), M. Feller-Kniepmeier, Technische Universität Berlin (FRG)
Application of a Finite Element Model to the Microstructure of a Nickel Based Superalloy with High Volume Fraction of γ' -Phase
- IV. 2 W. Mitter (Sp), G. Wiedner, F. Wimmer, E. T. Till, Böhler GmbH, Kapfenberg (Austria)
Temperature and Stress Field During Cooling of a Gas Turbine Blade after Forging
- IV. 3 B. Sitaud (Sp), X. Zhang, C. Dimitrov, O. Dimitrov, Centre National de la Recherche Scientifique – Centre d'Etudes de Chimie Metallurgique, Vitry-sur-Seine (France)
Self-Diffusion and Kinetics of Atomic Ordering in the γ and γ' Phases of Nickel Based Model Superalloys
- IV. 4 A. Marty (Sp), M. Bessiere, Y. Calvayrac, S. Le Febvre, Centre National de la Recherche Scientifique – Centre d'Etudes de Chimie Metallurgique, Vitry-sur-Seine (France)
Determination of Long Range Order in Ni-Base Ternary Alloys by X-Ray Anomalous Diffraction Using Synchrotron Radiation
- IV. 5 C. Dimitrov (Sp), X. Zhang, B. Sitaud, O. Dimitrov, U. Dedek, F. Dworschak, Centre National de la Recherche Scientifique – Centre d'Etudes de Chimie Metallurgique, Vitry-sur-Seine (France)
Composition Dependence of the Properties of Irradiation Induced Defects in γ Ni (Al), γ Ni (Al,Ti) and γ' Ni₃Al Alloys
- IV. 6 N. Njah (Sp), A. Chamberod, V. Naundorf, O. Dimitrov, Centre National de la Recherche Scientifique – Centre d'Etudes de Chimie Metallurgique, Vitry-sur-Seine (France)
The Effects of Low-Dose Irradiation on the Mechanical Properties of NiAlTi Model Superalloys

Affiliation refers to speaker (Sp).

Poster Group V.**Single Crystal Superalloys**

- V. 1 P. Caron (Sp), T. Khan, ONERA, Châtillon (France)
Development of a New Nickel Based Single Crystal Turbine Blade Alloy for Very High Temperatures
- V. 2 H.-J. Klam (Sp), E. W. Blank, Ecole Polytechnique Fédérale de Lausanne (Switzerland)
The Growth of Modern Superalloy Single Crystals
- V. 3 J. Lacaze (Sp), D. Bellet, N. Siredey, J. P. Michel, A. George, P. Bastie, Ecole des Mines, Nancy (France)
"Crystalline Quality" of Directionally Solidified Single Grains of a Nickel-Based Superalloy
- V. 4 A. Coujou (Sp), P. Lours, B. de Mauduit, Université Paul Sabatier, Toulouse (France)
High Temperature Stress-Induced Spreading of Stacking Faults in the γ' Phase of the CMSX2 Superalloy
- V. 5 E. W. Blank (Sp), H.-J. Klam, Ecole Polytechnique Fédérale de Lausanne (Switzerland)
Creep Anisotropy of Single Crystalline Superalloys
- V. 6 T. Grosdidier (Sp), A. Hazotte, A. Simon, Ecole des Mines, Nancy (France)
Chemical Segregation and Chemical Processes in Single Crystal Nickel-Based Superalloys
- V. 7 A. Hazotte (Sp), T. Grosdidier, A. Simon, Ecole des Mines, Nancy (France)
Coarsening Kinetics and Morphological Changes of the γ' Phase in a Single Crystal Nickel-Based Superalloys

Affiliation refers to speaker (Sp).

Poster Groupe VI.**Microstructure and Properties of Superalloys**

- VI. 1 H.-A. Kuhn (Sp), U. Siebert, H. G. Sockel, Universität Erlangen-Nürnberg, Erlangen (FRG)
Elastic Properties and Microstructure of Nickel-Based Superalloys at High Temperature
- VI. 2 U. Siebert (Sp), H. G. Sockel, Universität Erlangen-Nürnberg, Erlangen (FRG)
Measured and Calculated Elastic Properties of Directionally Solidified Ni-Based Superalloys
- VI. 3 R. P. Wahi (Sp), M. Sundararaman, V. Singh, W. Chen, Hahn-Meitner-Institut Berlin GmbH, Berlin (FRG)
Temperature Dependence of Stress Response and Microstructural Evolution in Nimonic PE16 under Low Cycle Fatigue Loading
- VI. 4 M. Rödiger (Sp), M. Pfaffelhuber, F. Schubert, H. Nickel, Kernforschungsanlage Jülich (FRG)
Examination of Creep-Fatigue Crack Growth in Alloy 800 at 700° C
- VI. 5 M. Spaniol (Sp), K. Schreck, KHD Luftfahrttechnik GmbH, Oberursel (FRG)
Improvement of the Static and Dynamic Strength Characteristics of Nickel-Based Cast Alloys
- VI. 6 R. P. H. Fleming, Thames Polytechnic, London (UK)
The Structure and Properties of New High Strength Nickel-Based Alloys
- VI. 7 E. Tekin, Middle East Technical University, Ankara (Turkey)
Microstructural Characteristics of an Ethylene Cracking Pipe
- VI. 8 P. von den Brincken (Sp), P. Busse, P. R. Sahm, Aachener Centrum für Erstarrung unter Schwerelosigkeit e. V., Aachen (FRG)
Metal-Ceramic-Composites for High Temperature Applications

Affiliation refers to speaker (Sp).

Poster Groupe VII.**Heat Resistant and High Strength Steels**

- VII. 1 F. Groisböck (Sp), R. Ebner, F. Jeglitsch, Montanuniversität Leoben (Austria)
Creep Behaviour of a Heat Resistant Ferritic Chromium Steel
- VII. 2 T. Pmka (Sp), Z. Bemberek, V. Foldyna, The Iron and Steel Research Institute, Dobra (CSSR)
Microalloyed Steels for High Temperature Service
- VII. 3 J. Chodorowski (Sp), J. Wasiak, A. Balul, Warsaw University of Technology (Poland)
Structural Degradation and Its Effect on the Mechanical Properties of 15HM(Cr-Mo) Steel
- VII. 4 H. Cerjak (Sp), B. Buchmayr, H. P. Fauland, University of Technology Graz (Austria)
The Effect of Precipitation Behaviour on the HAZ-Properties of 1% Cr-Mo-V Steel
- VII. 5 H.-J. Christ (Sp), F. Petry, H. Mughrabi, Universität Erlangen-Nürnberg, Erlangen (FRG)
Isothermal and Thermomechanical Fatigue Behaviour of the Austenitic Stainless Steel 304 L Between Room Temperature and 650° C in High Vacuum
- VII. 6 R. H. Kozłowski, Cracow Technical University (Poland)
Creep Fracture in Stabilized Austenitic Stainless Steels
- VII. 7 A. Holý (Sp), P. Veles, East Slovakia Iron Works, Košice (CSSR)
Relation Between Fracture Toughness and Structural Parameters of High-Strength Microalloyed Steel

Poster Group VIII.**High Temperature Intermetallics**

- VIII. 1 M. Dahms, GKSS-Forschungszentrum, Geesthacht (FRG)
Production of Intermetallic Phases by Solid State Reaction of Cold Extruded Elemental Powders
- VIII. 2 M. Strangwood (Sp), R. James, C. A. Hipsley, Harwell Laboratory, Didcot (UK)
Grain Boundary Precipitation in Ni₃Al Based Alloys
- VIII. 3 J. Bonneville (Sp), N. Baluc, J. L. Martin, Ecole Polytechnique Fédérale de Lausanne (Switzerland)
On the Anomalous Temperature Dependence of the Mechanical Strength of Ni₃Al
- VIII. 4 L. Singheiser (Sp), H. W. Grünling, Asea Brown Boveri AG, Mannheim (FRG)
Oxidation and Hot Corrosion Behaviour of Intermetallics
- VIII. 5 A. Baldan, DMST, CSIR, Pretoria (South Africa)
Electron Microprobe Investigation of Lower Melting Regions in the As-Cast Structure of a DS 200 + Hf Single Crystal

Affiliation refers to speaker (Sp).

Poster Group IX.**Phase Diagrams for High Temperature Materials**

- IX. 1 J. Golczewski (Sp), M. Bamberger, S. Dirnfeld, E. Gozlan, J. Klodt, B. Prinz,
H. L. Lukas, Max-Planck-Institut für Metallforschung, Stuttgart (FRG)
**Phase Diagrams of the Ni-Fe-Mo and Ni-Cr-Mo Ternary Systems -
Experiments and Thermodynamic Calculations as a Basis for Superalloy
Development**
- IX. 2 M. Durand-Charre (Sp), D. David, P. Willemin, Institut National Polytechnique de
Grenoble, St. Martin d'Hères (France)
**Pseudo Ternary Systems as Models to Explain the Metallurgical Structure of
Superalloys**
- IX. 3 L. B. Hussain Al-Yasiri, University of Technology, Baghdad (Iraq)
Microscopic Structural Study of the NiCrAl Ternary System
- IX. 4 V. Ojha (Sp), J. Drapala, M. K. Bhargava, L. Kuchar, CSIR, New Delhi (India)
Study of the Distribution Coefficient of Tungsten in Tantalum

Poster Group X.**High Temperature Corrosion and Oxidation**

- X. 1 J. Jedlinski, Technische Universität Clausthal, Clausthal-Zellerfeld (FRG)
The Beneficial Effect of Reactive Elements on the Oxidation Behaviour of Alumina-Forming Materials at High Temperature – A Review
- X. 2 K. Fritscher (Sp), Y. T. Lee, Deutsche Forschungsanstalt für Luft- und Raumfahrt, Köln (FRG)
Effect of Differently Processed NiCoCrAlY Coatings on Microstructure and on Hot Corrosion Resistance
- X. 3 G. Borchardt (Sp), J. Jedlinski, S. Mrowec, Technische Universität Clausthal, Clausthal-Zellerfeld (FRG)
The Effect of Reactive Elements on the High-Temperature Oxidation Behaviour of Ferritic FeCrAl Alloys
- X. 4 K. Kokkinopitis (Sp), P. Christodoulou, MIRTEC S. A., Volos (Greece)
A Model to Predict the Oxidizing-Carburizing Resistance of Austenitic Stainless Steels as a Function of Alloy Chemistry
- X. 5 W. Storch (Sp), H. Roggendorf, H. Schmidt, M. Hastenrath, Fraunhofer-Institut für Silicatforschung, Würzburg (FRG)
Study of Insulation Layer Formation on Electrical Steel Surfaces by X-Ray Photoelectron Spectroscopy and Electron Microprobe Analysis
- X. 6 K. Fritscher (Sp), H.-J. Rätzer-Scheibe, Deutsche Forschungsanstalt für Luft- und Raumfahrt, Köln (FRG)
Burner Rig Tests of EB-PVC Coatings on DSE γ/γ' - α
- X. 7 A. Walder (Sp), D. Locq, C. Delaunay, ONERA, Châtillon (France)
New Metallic Felts with Improved Resistance to High Temperature Oxidation

Affiliation refers to speaker (Sp).

Poster Group XI.**Ceramics and Non-Metal Composites**

- XI. 1 R. Hamminger (Sp), C. Boberski, F. Aldinger, Hoechst AG, Frankfurt (FRG)
Microstructural Aspects of the Processing of Sintered SiC and Si₃N₄
- XI. 2 G. A. Schneider (Sp), G. Andrees, R. Danzer, C. Rief, A. Wanner, Max-Planck-Institut für Metallforschung, Stuttgart (FRG)
Physical Properties and Fracture Mechanics of Pressureless Sintered SiC
- XI. 3 M.-L. Vesanen (Sp), P. Järvelä, Tampere University of Technology (Finland)
Injection Moulding of Alumina
- XI. 4 M. Hubáček (Sp), B. Řehák, The Iron and Steel Research Institute, Karlštejn (CSSR)
Hot Pressing of Hexagonal Boron Nitride
- XI. 5 R. Elsing (Sp), O. Knotek, U. Balting, RWTH Aachen (FRG)
Simulation Models for Studying Properties of Composite Materials Manufactured by Thermal Spraying Processes using Ceramic Powders
- XI. 6 W. Huettner (Sp), R. Weiss, Schunk Kohlenstofftechnik GmbH, Gießen (FRG)
Oxidation Inhibited Carbon/Carbon: a Candidate Material for Hot Structures
- XI. 7 E. Proverbio (Sp), F. Carassiti, R. Cigna, E. Fazio, Università Degli Studi di Roma "La Sapienza" (Italy)
Preparation and Testing of Ceramic Probes (SnO₂ and Cr₂O₃) for the Measurement of Al₂O₃ Concentration in Electrolytic Aluminium Cells
- XI. 8 F. Castro (Sp), I. Iturriza, J. Echeberria, Centro de Estudios e Investigaciones Técnicas de Guipuzcoa, San Sebastian (Spain)
Glass Powder Encapsulation and Hipping of Silicon Nitride Ceramics

Poster Group XII.**High Temperature Superconductors**

- XII. 1 M. Muhammed (Sp), K. V. Rao, Y. Zhang, The Royal Institute of Technology, Stockholm (Sweden)
Computer Based Modelling and Solution Processing of Powder Materials
- XII. 2 M. Calamiotou (Sp), N. Guskos, T. Leventouri, V. Perdikatsis, University of Athens (Greece)
High Temperature Superconductor Bi-Sr-Ca-Cu-O with $T_c=80K$
- XII. 3 Y. Ivanova (Sp), Y. Dimitriev, B. Samuneva, E. Gattev, V. Michailova, A. Staneva, Higher Institute of Chemical Technology, Sofia (Bulgaria)
Glass-Ceramic and Ceramic Materials in the Bi-Ca-Sr-Cu-O and Bi-Ca-Sr-Cu-Pb-O Systems
- XII. 4 E. Kashchieva (Sp), Y. Dimitriev, Y. Pirov, D. Lepkova, E. Gatev, V. Dimitrov, S. Djambazov, Higher Institute of Chemical Technology, Sofia (Bulgaria)
Microstructure and Phase Formation of Ceramic Material in the Nd-Ba-Cu-Ag-O System

Affiliation refers to speaker (Sp).

Poster Group XIII.**Light Alloys and Light Metal Matrix Composites**

- XIII. 1 M. A. Däubler (Sp), M. T. Cope, MTU Motoren- und Turbinen-Union München GmbH, München (FRG)
Influence of Heat Treatment on Microstructure and Properties of an Advanced High-Temperature Titanium Alloy
- XIII. 2 G. Cam (Sp), H. M. Flower, D. R. F. West, Imperial College, London (UK)
Phase Transformations in Ti-Al-C Alloys
- XIII. 3 T. P. Johnson (Sp), J. W. Brooks, M. H. Loretto, University of Birmingham (UK)
The Preparation of Ti-Based Metal Matrix Composites Via a Casting Route
- XIII. 4 G. Avramović-Cingara (Sp), H. J. McQueen, G. L'Esperance, Faculty of Technical Science, Novi Sad (Yugoslavia)
Substructure Developed in the Hot Working of Al-Li Alloys
- XIII. 5 A. A. Mazhar (Sp), Q. R. Ali, A. Q. Khan, Dr. A. Q. Khan Research Laboratories, Rawalpindi (Pakistan)
Effect of Casting Parameters and Heat Treatment on the Properties of an Investment Cast Al-7Si-4Cu Alloy Component
- XIII. 6 M. Strangwood (Sp), N. J. Taylor, C. A. Hipsley, Harwell Laboratory, Didcot (UK)
The Effect of the Matrix-Reinforcement Interface on the Ageing Response of an Aluminium 6061 Alloy Reinforced with 20 vol % SiC Particulates
- XIII. 7 M. Hubert-Protopopescu (Sp), H. Hubert, Max-Planck-Institut für Metallforschung, Stuttgart (FRG) – External Fellow-Worker
High-Strength Wrought Al-Zn-Mg-Cu Alloys for Aeronautical Applications
- XIII. 8 K. U. Kainer, Technische Universität Clausthal, Clausthal-Zellerfeld (FRG)
Properties of Consolidated Magnesium Alloy Powder

Poster Group XIV.**Rapidly Solidified and Amorphous Metals**

- XIV. 1 J. Szablewski (Sp), B. Kuźnicka, Technical University of Wrocław (Poland)
Electrical Properties of Rapidly Solidified Cu-Cr Alloys
- XIV. 2 W. Zaprianova (Sp), R. Raicheff, E. Kashieva, V. Dimitrov, Higher Institute of Chemical Technology, Sofia (Bulgaria)
Effect of Thermally Induced Structural Changes on the Corrosion Behaviour of Amorphous $\text{Co}_{70,3}\text{Fe}_{4,7}\text{Si}_{18}\text{B}_{10}$ Alloys
- XIV. 3 E. Gatev (Sp), D. Parlapanski, Higher Institute of Chemical Technology, Sofia (Bulgaria)
Interatomic Pair Potentials for Amorphous Metallic Alloys
- XIV. 4 M. Petrescu (Sp), N. Petrescu, M. Isac, V. Oltean, M. Călin, C. Sandor, Polytechnic Institute of Bucharest (Romania)
Selection and Characterization of Some Amorphous Ferromagnetic Alloys

Affiliation refers to speaker (Sp).

Poster Group XV.**Shape Memory Alloys**

- XV. 1 S. Tan (Sp), H. Xu, I. Müller, Technische Universität Berlin (FRG)
All-Round Shape Memory Effect and Its Physical Simulation Model
- XV. 2 S. Tan (Sp), H. Xu, S. N. Roy, K. H. Kim, B. Hinz, I. Müller, Technische Universität Berlin (FRG)
The Thermomechanical Behaviour and Microstructure of Cu-Al-Ni Single Crystals with Shape Memory
- XV. 3 S. N. Roy (Sp), S. Tan, H. Xu, K. H. Kim, B. Hinz, I. Müller, Technische Universität Berlin (FRG)
Growth of CuZnAl and CuAlNi Single Crystals with Shape Memory Effects
- XV. 4 H. Xu (Sp), I. Müller, Technische Universität Berlin (FRG)
Hysteresis in Shape Memory Alloys
- XV. 5 J. Stoiber (Sp), R. Gotthardt, J. Van Humbeeck, Institut de Génie Atomique, Lausanne (Switzerland)
Interface Reactions During Martensitic Transformation in Cu-Zn-Al Shape Memory Alloys

Poster Group XVI.**Electrodeposited Layers**

- XVI. 1 H. Wendt (Sp), K. Reuhl, V. Schwarz, Technische Hochschule Darmstadt (FRG)
Formation of TiB_2 -Layers of High Quality on Carbon Substrate and TiB_2 (ZrB_2) Production by Cathodic Deposition from Fluoride Melts
- XVI. 2 Z. Loizos (Sp), N. Spyrellis, G. Maurin, National Technical University of Athens (Greece)
Polycrystalline $CdSe_xTe_{1-x}$ Thin Films Prepared by Electroplating in an Aqueous Medium
- XVI. 3 A. Argyriou (Sp), A. Tsitopoulos, N. Spyrellis, National Technical University of Athens (Greece)
Influence of Interfacial Adsorption on the Texture and the Microhardness of Nickel Electrodeposits
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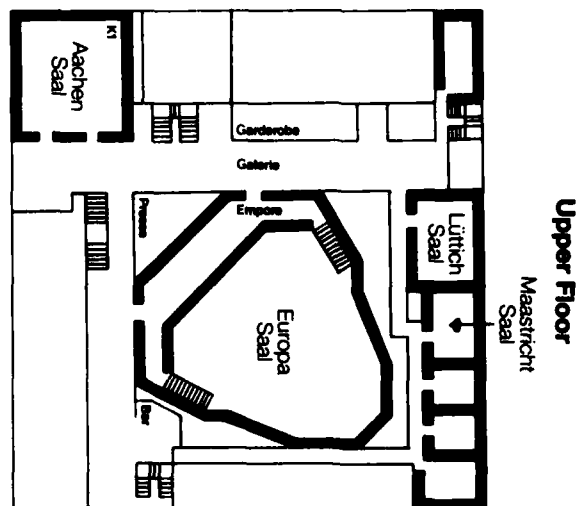
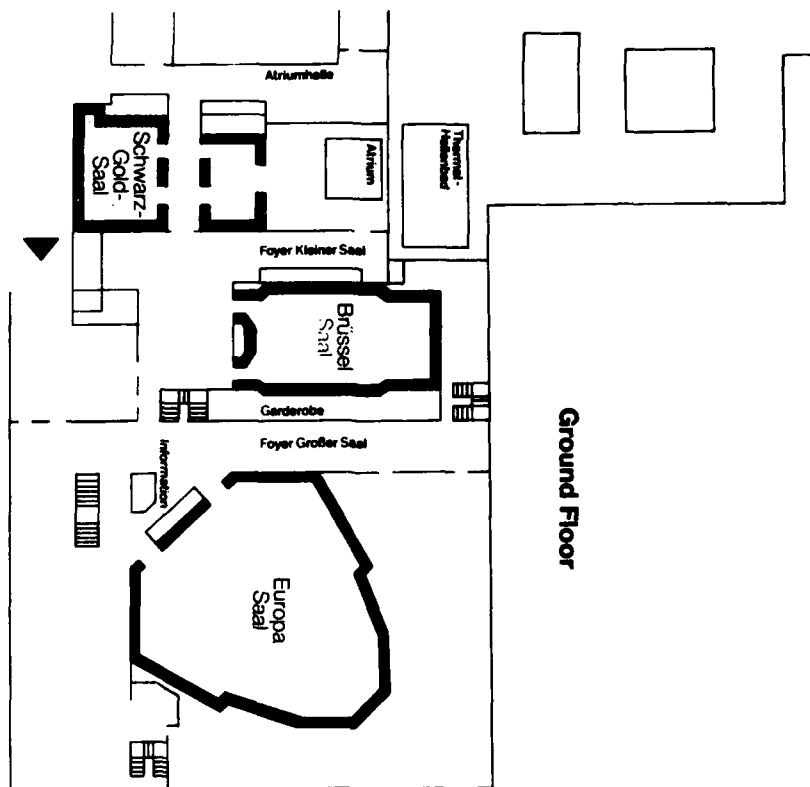
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p.m.

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14.00-18.10 h
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14.00-18.10 h
Biomaterials
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14.00-18.10 h
I Ceram. Pack.
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Thursday

a.m.

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p.m.

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II Casting
III Powder Techn.
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I Superalloys
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III Composites
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18.30 h
Poster Ev.

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I Thin Film Pack. and
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II Met./Ceram. Interfaces
and Packaging
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I Scanning
Tunnelling +
Force Micr.
II Acoustic
Sca. Micr.
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